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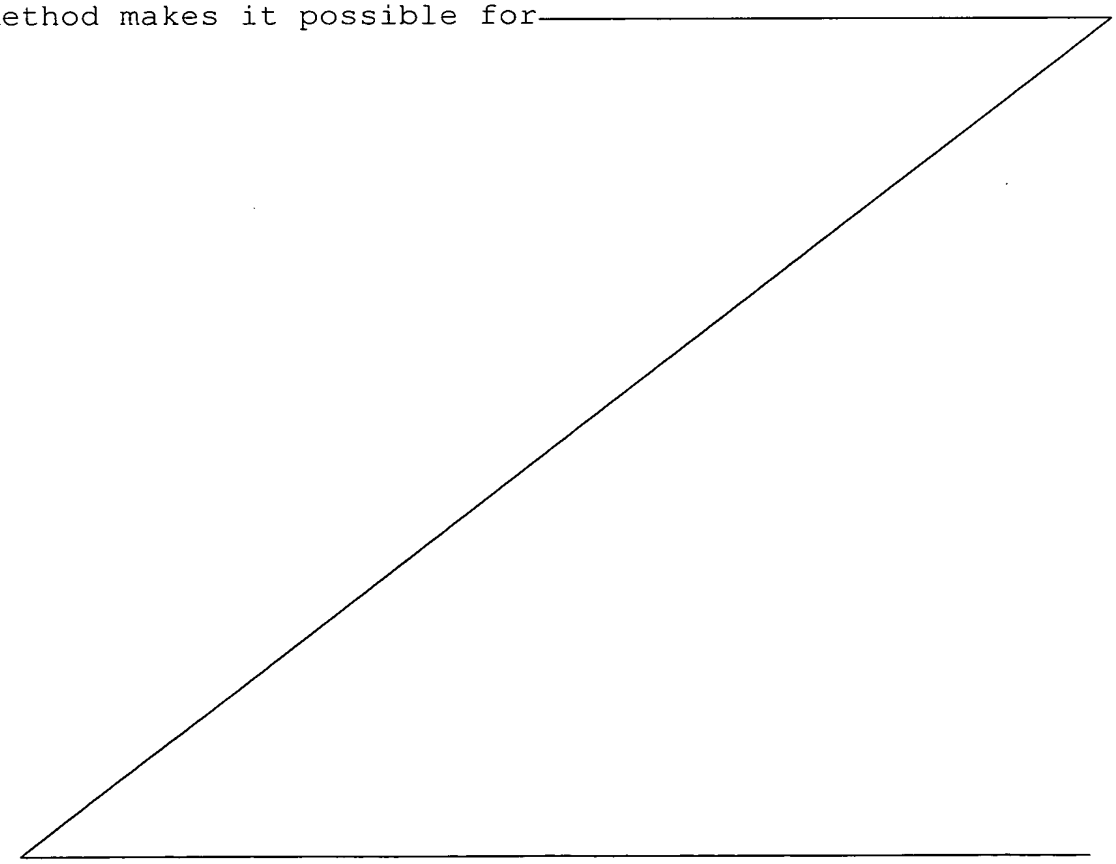
# Method for production of an object and an object produced by said method

The invention relates to a method for production of an object with a first layer, which is bonded to a second layer, the first layer being plastically deformable and having a front side and a rear side, and the bonding of the two layers taking place in an injection mold.

JP 59 001236 A (Yoshida Kogyo KK) discloses a method for producing a three-dimensional pattern. This involves printing onto a film and, after curing of the print, laminating the very soft film by injecting plastic behind it in an injection mould. During the in-mold lamination, the ink is pressed into the very soft film, which is thereby deformed. In the non-printed region, the film is pressed outward and plastically deformed. On the visible side, this has the effect that the non-printed regions of the film are raised and thereby produce a three-dimensional structure. A disadvantage of this method is that, on account of the protrusion of the non-printed regions, a convex curvature of the part can scarcely be avoided. The three-dimensional structure is dependent on the materials used and likely to be difficult to reproduce. In order that the three-dimensional structure is obtained, the film must be very soft and elastic. Hard foils, made of steel for example, cannot be used here.

In-mold lamination of films by the injection-molding process has long been known in the prior art. This involves inserting a film, for example a metal foil, into an injection mold and injecting thermoplastic material behind it. It is also known to provide the front side of the film with depressions, these depressions forming for example an inscription or a pattern. For this purpose, the injection mold is structured on the inside in a way corresponding to the depressions to be produced on the film. During the in-mold lamination, the film is pressed against the structured inner side of the injection mold. Such a process is known for example for the production of inserts in sill trim moldings. These inserts are consequently respectively provided on their front side with depressions which give an optical effect of depth. The depressions form an inscription for example. This method makes it possible for



## Patent claims

1. A method for production of an object (10, 10') with a first layer (1), which is bonded to a second layer (2), the first layer being plastically deformable and having a front side (1a) and a rear side (1b), and the bonding of the two first layer (1, 2) taking place in an injection mold, with the following method steps:

   a) the first layer (1) is partially provided with an at least partially transparent coating (4') on its front side (1a),

   b) the coating (4') is cured,

   c) the first layer (1) is inserted into an injection mold (6),

   d) the first layer (1) is pressed with its front side (1a) against an inner side (7) of the injection mold (6), the cured coating (4') changing the form of the first layer (1) and at least partially creating an impression in the first layer (1),

   e) the product (10, 1d) is demolded, said product exhibiting an optical effect of depth on the front side on account of the transparent coating (4').

2. The method as claimed in claim 1, characterized in that the coating (4') is impressed substantially completely into the first layer (1) and forms one or more depressions (3) in the latter (4').

3. The method as claimed in claim 1 or 2, characterized in that the first layer (1) is laminated in the injection mold (6) by injecting plastic behind it and the second layer (2) is thereby formed.

4. The method as claimed in one of claims 1 to 3, characterized in that a thermoplastic is injected behind the first layer (1).

5. The method as claimed in one of claims 1 to 4, characterized in that the first layer (1) is provided with an adhesion promoter (8) on its rear side (1b) before the in-mold lamination.

6. The method as claimed in one of claims 1 to 5, characterized in that the first layer (1) is a metal foil, in particular an aluminum foil or steel foil.

7. The method as claimed in one of claims 1 to 7, characterized in that the thickness (D) of the first layer (1) is 0.5 mm or less, preferably 0.1 mm or less.

8. The method as claimed in one of claims 1 to 6, characterized in that the thickness (D) of the first layer (1) is 0.1 to 0.3 mm.

9. The method as claimed in one of claims 1 to 8, characterized in that the coating (4') has a thickness (H) of from 2 to 1000 micrometers, preferably 2 to 100 micrometers.

10. The method as claimed in one of claims 1 to 9, characterized in that the thickness (H) of the coating (4') is 4 to 10 micrometers.

11. The method as claimed in one of claims 1 to 10, characterized in that the coating (4') is an imprint.

12. The method as claimed in one of claims 1 to 11, characterized in that the coating (4') is produced from one or more printing inks.

13. The method as claimed in claim 12, characterized in that the printing ink is at least partially transparent.

14. The method as claimed in one of claims 1 to 13, characterized in that the coating (4') is applied by screen printing or pad printing.

15. The method as claimed in one of claims 1 to 14, characterized in that the coating (4') is cured thermally, with UV radiation, chemically or by exposure to air.

16. The method as claimed in claim 15, characterized in that the imprint (4') is cured at 70 to 100°C, preferably approximately 80°.

17. The method as claimed in one of claims 1 to 16, characterized in that the coating (4') comprises more than one layer.

18. The method as claimed in one of claims 1 to 18, characterized in that the coating (4) is at least partially removed, preferably dissolved away or pulled off.

19. The method as claimed in one of claims 1 to 18, characterized in that a decorative part or a trim molding for a motor vehicle is produced.

20. An object, produced by the method as claimed in claim 1, characterized in that the front side (1a) of the first layer (1) partially has a depression or depressions (3), which are deformations and in particular impressions created by a partial coating (4), the coating (4) being transparent.

21. The object as claimed in claim 20, characterized in that the depression or depressions (3) are completely or partially filled with a printing ink.

22. The object as claimed in claim 20 or 21, characterized in that the coating (4) has an upper side (4a) which is arranged deeper than the front side (1a) of the first layer (1).

23. The object as claimed in one of claims 20 to 22, characterized in that the coating (4) is a printing ink.

24. The object as claimed in one of claims 20 to 23, characterized in that the first layer (1) is a metal foil and has a thickness (D) which is less than 0.5 mm, preferably 0.1 to 0.3 mm.

25. The object as claimed in one of claims 20 to 24, characterized in that it is a decorative part or a trim molding for a motor vehicle.

26. The object as claimed in one of claims 20 to 25, characterized in that the second layer (2) is an injection-molded part.

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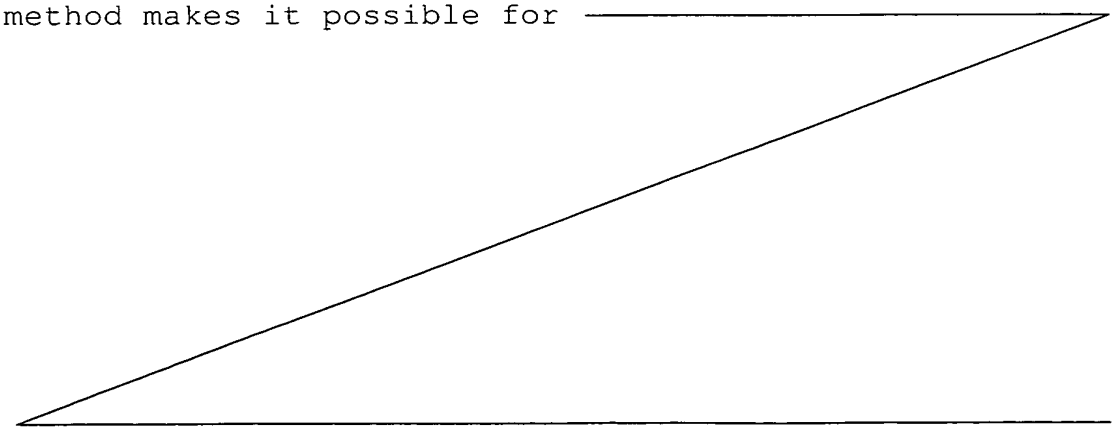
Patent Abstracts of Japan, Volume 8, No. 83 (M 290), April 17, 1984 and JP 59001236 disclose a method for producing a three-dimensional pattern. This involves printing onto aluminum foil and, after curing of the print, this foil is laminated by injecting plastic behind it in a casting mold. The in-mold lamination takes place with a resin, the injection pressure being comparatively low in comparison with the injection pressure of thermoplastics. Therefore, here the laminated foil consists of soft aluminum. Hard aluminum or high-grade steel could not be used here. During the in-mold lamination, the ink is pressed into the aluminum foil, which is thereby deformed. In the non-printed region, the film is pressed outward and plastically deformed. On the visible side, this has the effect that the non-printed regions of the film are raised and produce a three-dimensional structure on the component by subsequent different shrinkage, as shown in Figure 5. A disadvantage of this method is that, on account of the protrusion of the non-printed regions, a

convex curvature of the part can scarcely be avoided. The three-dimensional structure is dependent on the materials used and likely to be difficult to reproduce. A defined dimensional stability is likely to be very restricted. In order that the three-dimensional structure is obtained, the film must be comparatively soft and elastic. Hard foils, made of steel for example, cannot be used here.

In-mold lamination of films by the injection-molding process has long been known in the prior art. This involves inserting a film, for example a metal foil, into an injection mold and injecting thermoplastic material behind it. It is also known to provide the front side of the film with depressions, these depressions forming for example an inscription or a pattern. For this purpose, the injection mold is structured on the inside in a way corresponding to the depressions to be produced on the film. During the in-mold lamination, the film is pressed against the structured inner side of the injection mold. Such a process is known for example for the production of inserts in sill trim moldings. These inserts are consequently respectively provided on their front side with depressions which give an optical effect of depth. The depressions form an inscription for example. This method makes it possible for



## Patent claims

1. A method for production of an object (10, 10') with a first layer (1), which is bonded to a second layer (2), the first layer being plastically deformable and having a front side (1a) and a rear side (1b), and the bonding of the two layers (1, 2) taking place in an injection mold, with the following method steps:

a) the first layer (1) is partially provided with a coating (4') on its front side (1a),

b) the coating (4') is cured,

c) the first layer (1) is inserted into the injection mold (6),

d) the first layer (1) is pressed with its front side (1a) against an inner side (7) of the injection mold (6), the cured coating (4') changing the form of the first layer (1) and at least partially creating an impression in the first layer (1),

e) the product (10, 1d) is demolded, characterized in that the coating (4') is at least partially transparent and in that the product exhibits an optical effect of depth on the front side on account of the at least partially transparent coating (4').

2. The method as claimed in claim 1, characterized in that the coating (4') is impressed substantially completely into the first layer (1) and forms one or more depressions (3) in the latter (4').